



# EPIDEMIOLOGIST

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## Blastomycosis Investigation in Southeast Missouri

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Southeastern District Health Office

Since 1994, there has been ongoing discussion and concern about the number of blastomycosis cases occurring in southeastern Missouri, especially Mississippi County. In August 1999, a 19-year-old Mississippi County resident died due to blastomycosis. This case brought the total number of known blastomycosis cases occurring since 1992 in Mississippi, New Madrid and Scott counties to 14, with five deaths. It also prompted a request to the Missouri Department of Health's (MDOH's) Section of Communicable Disease Control and Veterinary Public Health for an epidemiologic investigation to determine the number and distribution of blastomycosis cases in southeastern Missouri.

Blastomycosis has not been reportable in Missouri, therefore the prevalence of the disease is unknown. As a starting point for the investigation, a list of positive blastomycosis test results for Missouri patients from 1992-99 was requested from the Tuberculosis Unit of the Missouri Rehabilitation Center (which conducts blastomycosis tests). The list obtained included 37 positive blastomycosis lab results, 20 of which were for patients residing in the following counties located in the Southeastern Health District: Cape Girardeau 1, Scott 2, New Madrid 3, Pemiscot 2 and Mississippi 12 (8 in Charleston, MO). These results prompted a request by MDOH to the Centers for Disease Control

and Prevention's (CDC's) Division of Bacterial and Mycotic Diseases for assistance in investigating the apparent cluster of blastomycosis cases in southeastern Missouri

On January 10, 2000, two Epidemic Intelligence Service (EIS) Officers from CDC arrived in Charleston, MO, to assist in the investigation. A public meeting was held that evening at the Mississippi County Health Department in Charleston to advise the community about the investigation. The meeting included a question and answer session. Approximately 25 individuals attended the meeting.

The subsequent investigation consisted of active case finding and a case/control study. Genetic testing was also performed as an adjunct.

### Case Finding Activities

With the assistance of area hospitals and MDOH staff, 97 blastomycosis cases diagnosed during the period from 1992 to 1999 were identified statewide; 43 were from southeastern Missouri. A decision was made that the study should include the following counties in southeastern Missouri: Butler, Cape Girardeau, Dunklin, Mississippi, New Madrid, Pemiscot, Scott and Stoddard.

### Case/Control Study

An attempt was made to contact all identified blastomycosis cases in southeastern Missouri (including family members of deceased cases), along with

four randomly selected age- and sex-matched controls for each case. Controls had to live in the same city or rural area as the case. A questionnaire was completed for each case and control.

### Genetic Study

MDOH and CDC will be partnering with the National Institutes of Health (NIH) to obtain genetic testing on blood specimens from as many blastomycosis cases as possible. Since little is known about the incidence of blastomycosis, NIH hopes the genetic testing will provide additional information about the disease.

It will take several months to analyze the data obtained from the investigation, and it is unknown if additional risk factors will be identified or major conclusions reached. However, another important goal of the investigation is to raise awareness among health care providers and the general public regarding the

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# Heat Surveillance Summary - 1999

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The summer of 1999 in Missouri started with very comfortable temperatures. However, when the summer was over, Missouri had experienced a two-week heat wave and the highest number of heat-related illnesses and deaths since the great heat wave of 1980. During the summer of 1999, 968 heat-related illnesses and 92 heat-related deaths were reported in Missouri. See Figures 1 and 2.

The Missouri Department of Health issued a statewide Hot Weather Health Advisory on July 20, 1999. See side bar on page 3 for a description of the three advisory stages. The heat index on July 19 had been 110 in St. Louis, 107 in Kansas City, 104 in Columbia, 102 in Springfield and 105 in Cape Girardeau. The advisory was upgraded to a statewide Hot Weather Health Warning the next day when high heat indexes continued. Missouri remained under a statewide Hot Weather Health Warning until August 3 when heat indexes had dropped considerably. During this heat wave, there were eight days in a row when the heat index ranged from 105–119 statewide. The 13-day heat wave accounted for 68 percent (655/968) of the heat-related illnesses and 86 percent (79/92) of the heat-related deaths that occurred in 1999. The majority of the heat-related deaths occurred during the latter half of the nearly two-week heat wave. See Figure 3.

The first peak of heat-related illnesses and deaths in 1999 occurred from July 4–7 when the first wave of high heat indexes occurred in Missouri. An increase in heat-related illnesses in mid-August included approximately 100 high school band members treated for heat-related illness at the Missouri State Fair on August 12 when heat indexes reached a one-day peak with a heat index of 118 in St. Louis, 106 in Kansas City, 112 in Columbia, 112 in Springfield and 120 in

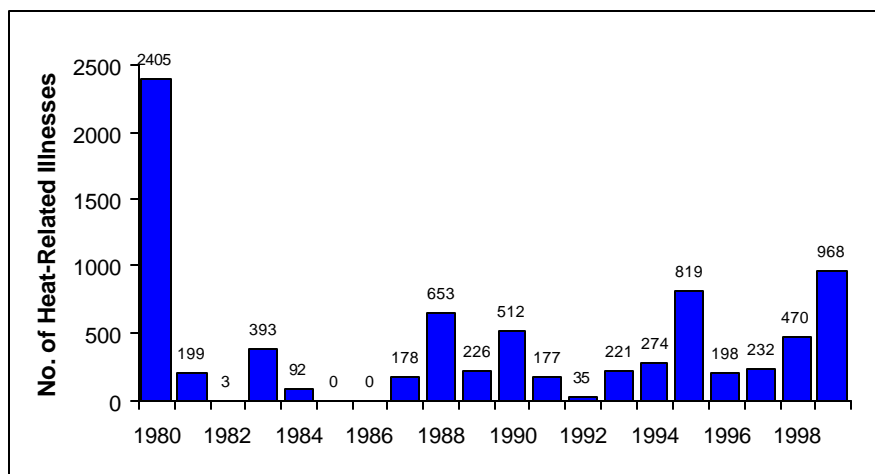


Figure 1. Reported heat-related illnesses by year, Missouri, 1980–99.

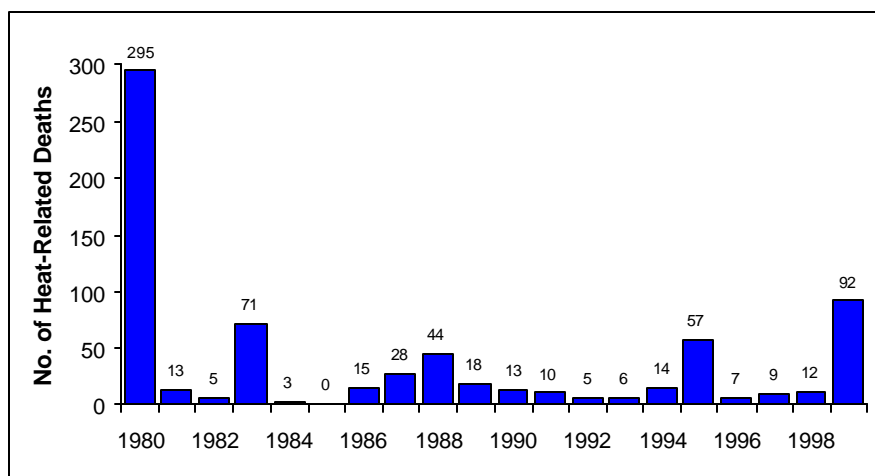


Figure 2. Recorded heat-related deaths by year, Missouri, 1980–99.

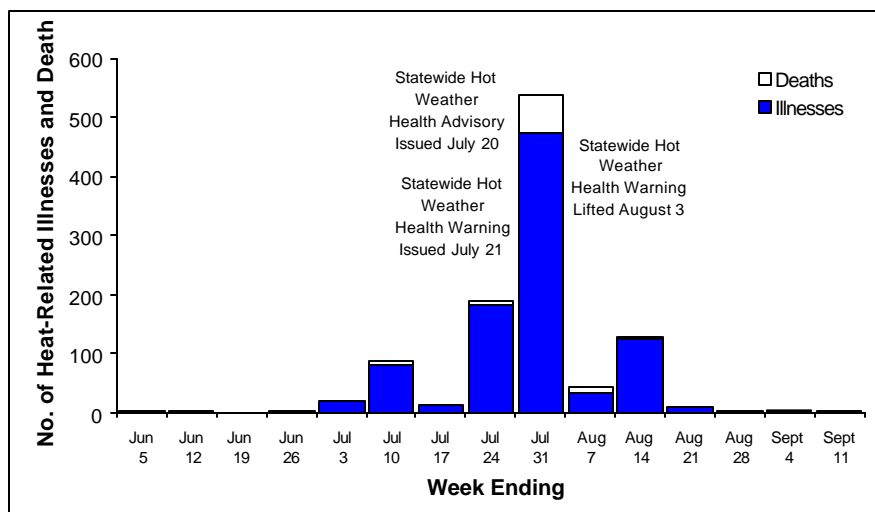


Figure 3. Reported heat-related illnesses and recorded heat-related deaths by week of occurrence, Missouri, Summer 1999.

Cape Girardeau. By the following day, heat indexes had dropped to below 85 for all areas except Cape Girardeau.

In 1998, one statewide Hot Weather Health Advisory was issued on June 25 and a statewide Hot Weather Health Warning was issued on July 20. In 1998, 470 heat-related illnesses and 12 heat-related deaths were reported in Missouri.

There are two distinct types of heatstroke. Both are characterized by extreme hyperthermia and multiple metabolic and hemodynamic abnormalities, but they arise in very different clinical settings.<sup>1</sup>

### Classic Heatstroke

Occurring primarily in epidemics during summer heat waves, classic heatstroke is most likely to affect the elderly and patients with serious underlying illnesses. Infants are also at risk. The urban poor are particularly vulnerable. The typical victim is confined at home without benefit of air conditioning or fans. Hence, when extreme ambient heat and humidity impair the body's ability to lose heat by radiation and evaporation, body temperature rises. Dehydration—common in the elderly—is an important predisposing factor. Other risk factors include obesity, neurologic or cardiovascular disease, and use of diuretics, neuroleptics or medications with anticholinergic properties that interfere with sweating. Alcohol use may be a risk factor.<sup>1</sup>

### Exertional Heatstroke

Like classic heatstroke, exertional heatstroke occurs during hot, humid weather. Typically, however, it occurs sporadically, affecting healthy young persons engaged in strenuous physical activity. In the United States, athletes, military recruits and industrial workers are at greatest risk. Predisposing factors include lack of acclimatization to the heat, lack of cardiovascular conditioning, heavy clothing and dehydration.<sup>1</sup>

Of the 92 heat-related deaths in 1999, 68 (74%) were in individuals aged 65 or older. Of those 68 elderly deaths, 63

**Department of Health**  
**Stages of Hot Weather Health Advisories**

A statewide **Hot Weather Health Advisory** will be issued when heat indexes of 105° in a large proportion of the state are first reached (or predicted). The Department of Health will inform the public about the risks of heat-related illness and urge concern for those at high risk. Monitoring of temperatures and heat indexes will be intensified. An **Advisory** will not be canceled.

A statewide **Hot Weather Health Warning** will be issued when:

1. Heat indexes, measured at peak afternoon temperatures, have remained at 105° or more for two days in a large proportion of the state **and**
2. When weather predictions are for continued high-stress conditions for at least 24-48 hours in a large proportion of the state.

During a **Warning**, the Department of Health will encourage local health departments to assure that cooling shelters are available and also encourage other community agencies to provide relief from the heat stress. A **Warning** will be downgraded or canceled when heat indexes in a large proportion of the state fall below 105° for 48 hours and the forecast is for 48–72 hours of continued relief from heat stress.

The Department of Health will recommend to the Governor that a statewide **Hot Weather Health Emergency** be declared when:

1. Extensive areas of the state are experiencing high and sustained levels of heat stress (determined when the heat index reaches 105° for three days); **and**
2. Surveillance data demonstrate increased levels of heat-related illness and death statewide; **and**
3. The National Weather Service predicts that hot and humid conditions are likely to continue for several days in a large proportion of the state.

An **Emergency** will be canceled when the heat indexes in a large proportion of the state fall below 105° for 48 hours and the National Weather Service predictions indicate a low probability for the return of severe conditions for the following 48 to 72 hours.

(93%) occurred inside residences and would meet the criteria of a classic heatstroke: 24 (38%) had no air conditioning, 19 (30%) had an air conditioner but would not use it, 11 (17%) had an air conditioner that was not working properly, and availability of air conditioning is unknown for 9 (14%) deaths. Of the 63 deaths, 35 (56%) were from the St. Louis area and 15 (24%) were from Kansas City.

During prolonged periods of high temperatures, air conditioning is the best preventive measure. The elderly and chronically ill are especially more vulnerable to heat because they may perspire less and are more likely to have health problems requiring medications that impair the body's natural defenses to adjust to heat. Most of the elderly were found in homes with fans blowing

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and windows closed. For some, even encouragement from relatives and friends could not convince them to use their air conditioners. Many did not or could not pay the high electric bill associated with air conditioning, while others stated they had made it through other hot summers without air conditioning or that the cold bothered their arthritis. One elderly individual was found in his home with the windows closed and still wearing thermal underwear.

Electric fans may be useful to increase comfort and to draw cool air into the home at night, but should not be relied on as the primary cooling device during a heat wave. When the temperature is in the upper 90s or higher, a fan will deliver overheated air to the skin at a rate that exceeds the capacity of the body to get rid of the heat, even with sweating, and the net effect is to add heat rather than to cool the body. The better alternative by far when the temperature soars is to use an air conditioner if one is available or to seek shelter in an air-conditioned building.

Of the 68 elderly deaths, five (7%) occurred outside. Three of those deaths would meet the criteria of an exertional heatstroke: one individual died working in the field on a tractor, another was mowing an embankment and the other was fixing a fence.

Of the 92 heat-related deaths in 1999, 24 (26%) were under age 65, ranging from 37 to 64 years old. Of those 24 deaths, 18 (75%) occurred inside residences and would meet the criteria of a classic heatstroke: 15 (83%) had no air conditioning, one (6%) had an air conditioner but would not use it and availability of air conditioning is unknown for two (11%) deaths. Most of these individuals were on medications for health conditions or were known to consume excessive amounts of alcohol. Of the 18 deaths, 7 (39%) were from the St. Louis area and 5 (28%) were from Kansas City.

Of the 24 deaths in those under 65, six (25%) occurred outside. One of these deaths might be classified as an exertional heatstroke; the individual had been exercising excessively outside. Two of the six deaths were in homeless individuals, two individuals fell outside due to excessive consumption of alcohol and one was sunbathing while consuming alcohol.

Weather forecasts call for another hot, dry summer in 2000. Therefore, the Missouri Department of Health encourages health care providers to reemphasize to patients preventive measures to reduce heat-related illness during prolonged hot weather:

- Avoid direct sunlight.
- Stay in coolest location available.
- Spend time in an air-conditioned place.
- Place wet towels or ice bags on the body or dampen clothes.
- Take cool baths or showers frequently.
- Reduce the number of layers of clothing.
- Wear lightweight, loose-fitting garments.
- Avoid strenuous physical activity and reschedule activities, such as shopping, to a cooler time of day.
- Increase intake of fluids such as water and juices.
- Avoid alcoholic beverages (beer, wine or liquor).
- Contact family or friends at least once a day.
- Check to see if medications you take affect the body's response to heat.
- Never leave infants, children or pets unattended in a parked car or other hot environment.

Health care providers who become aware of heat-related illnesses or deaths, are asked to report them promptly to their local public health agencies.

Further information on prevention of heat-related illness and past surveillance data for Missouri is available through

the Department of Health web site at <http://www.health.state.mo.us/ColdAndHeat/CAndH.html> or by calling the Office of Epidemiology at (573) 751-6128.

#### REFERENCE:

1. Simon HB. Hyperthermia and Heatstroke. *Hosp Pract*; August 15, 1994: 65-80.

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## Blastomycosis Investigation

(continued from page 1)

presence of blastomycosis in southeastern Missouri. Such increased awareness is intended to promote the early recognition of the signs/symptoms of the disease, as well as to emphasize the need for individuals to promptly seek medical attention should such signs/symptoms occur.

A blastomycosis fact sheet is printed on pages 5-6 of this issue. MDOH encourages health care providers to distribute copies of the fact sheet to patients/clients who are at-risk for acquiring blastomycosis, including men 30-59 years of age, and individuals with outdoor exposure during work, such as farmers and forestry workers, or individuals participating in recreational activities in wooded areas and along waterways.

A rule revision is in process that will add blastomycosis to the list of reportable diseases. To support the investigation, health care providers are strongly encouraged to report cases of blastomycosis to their local public health agency within three days of first knowledge or suspicion. Cases can also be reported to MDOH's Section of Communicable Disease Control and Veterinary Public Health at (573) 751-6113 or (800) 392-0272.

## **Blastomycosis Fact Sheet**

### **What is blastomycosis?**

Blastomycosis is a disease caused by a fungus that grows in moist soils, particularly wooded areas along waterways and in undisturbed places like under porches or sheds.

### **Who gets blastomycosis?**

Studies have shown that the risk for disease may be greater among middle-aged men, 30–59 years of age. Also at greater risk are those with outdoor exposure during work such as farmers and forestry workers or during recreational activities in wooded areas and along waterways. Exposure to soil has also been associated with risk of illness.

### **How do you get blastomycosis?**

You get blastomycosis by breathing dust that contains fungal spores. The disease also occurs in dogs, cats and other animals. It is not transmitted from animals to people or from person-to-person.

### **How long after exposure to the fungus do symptoms start?**

It takes from 3 weeks to 3 months, but symptoms will usually start within 45 days.

### **What are the symptoms of blastomycosis?**

The disease may present with sudden onset of fever or cough, and can resolve after 1–3 weeks of illness. But, more commonly, the onset is slow and the disease becomes chronic (long-lasting) and spreads from the lungs, causing skin sores usually on the face and fingers. It may also cause weight loss, weakness and low-grade fever. If untreated it can result in death.

### **How is blastomycosis diagnosed?**

A physician should be seen for testing and diagnosis.

### **Can blastomycosis be treated?**

Yes, the disease can be treated with medication prescribed by your physician.

### **How can blastomycosis be prevented?**

Prevention measures are unknown. However, activities which bring individuals closer to rotting wood and exposure with the soil such as hunting, fishing, or playing in soil near water may be associated with a greater risk of developing blastomycosis.

If symptoms occur, see a physician immediately. If you change physicians during the illness, be sure you tell the new physician what your symptoms were then and what medication you were given.

**Early diagnosis and treatment are important to prevent serious illness and death.**

For more information about blastomycosis, ask your physician or health care provider or contact:

**Missouri Department of Health  
Section of Communicable Disease Control  
and Veterinary Public Health  
Ph: (573) 751-6113  
or (800) 392-0272**

February 2000



MISSOURI DEPARTMENT OF

**HEALTH**

# Toll Free Numbers

TEAR OUT FOR FUTURE REFERENCE

5-Day-Program .....	(800) 316-0935
Asbestos .....	(800) 392-7245
Arthritis/Osteoporosis Education Program .....	(800) 316-0935
Cardiovascular Health Program .....	(800) 316-0935
Certified Occupational Rehabilitation Facilities Complaints and Information ...	(800) 877-6485
Child and Adult Care Food Program .....	(800) 733-6251
Childhood Lead Poisoning Program .....	(800) 575-9267
Children With Special Health Care Needs .....	(800) 451-0669
Communicable Disease Control .....	(800) 392-0272
Communicable Disease Case and Outbreak Reporting .....	(800) 392-0272
Cystic Fibrosis .....	(800) 451-0669
Diabetes Program .....	(800) 316-0935
Disabilities Prevention .....	(800) 877-6246
Environmental Public Health .....	(800) 392-7245
First Steps Program .....	(800) 451-0669
Foodborne Illness Investigation .....	(800) 392-7245
Genetic Diseases .....	(800) 877-6246
Hazardous Wastes .....	(800) 392-7245
Head Injury Program .....	(800) 451-0669
Healthy Children and Youth Program .....	(800) 451-0669
Hemophilia .....	(800) 451-0669
HIV/STD Information HOTLINE for State of Missouri .....	(800) 359-6259
Home Health Complaints and Information .....	(800) 877-6485
Hospice Complaints and Information .....	(800) 877-6485
Immunization Requirements .....	(800) 699-2313
International Travel Recommendations .....	(800) 699-2313
Injury Control Program .....	(800) 877-6246
Lead Licensing and Accreditation .....	(888) 837-0927
Lead Poisoning in Children .....	(800) 575-9267
Minority Health Issues .....	(800) 877-3180
Newborn Screening Program .....	(800) 877-6246
Nosocomial Infection Reporting .....	(800) 392-0272
Occupational Fatality HOTLINE .....	(800) 392-7245
Occupational Physical Therapy Clinic Complaints and Information .....	(800) 877-6485
On-Site Sewage Systems .....	(800) 392-7245
Organ Donor Program .....	(888) 497-4564
Physician Loan Repayment .....	(800) 891-7415
Primary Care Resource Initiative for Missouri (PRIMO) .....	(800) 891-7415
Professional and Practical Nurse Student Loan Program .....	(800) 891-7415
Radon HOTLINE .....	(800) 669-7236
Refugee Health Program .....	(800) 611-2912
Rural Health .....	(800) 891-7415
SAFE KIDS .....	(800) 877-6246
Sickle Cell Anemia .....	(800) 877-6246
Summer Food Service Program .....	(888) 435-1464
TEL-LINK .....	(800) 835-5465
Tuberculosis Control .....	(800) 611-2912
Vaccine-Preventable Diseases .....	(800) 699-2313
Vaccines for Children Program .....	(800) 219-3224
Veterinary Public Health .....	(800) 392-0272
Well Water Testing .....	(800) 392-7245
WIC Program .....	(800) 392-8209

# Bureau of Special Health Care Needs

Deborah White

Melinda Sanders

Bureau of Special Health Care Needs

The Bureau of Special Health Care Needs provides service coordination and financial assistance through a variety of programs such as the Adult Genetics Treatment Program and the Children with Special Health Care Needs Program.

## Adult Genetics Treatment Program

This program assists Missouri residents 21 years of age and older who meet both medical and financial eligibility requirements. Medical eligibility is documented with a written diagnosis of

- Hemophilia
- Sickle Cell Anemia or
- Cystic Fibrosis.

## Children with Special Health Care Needs Program

This program provides early identification and health services for participants

from birth until the age of 21 years, who meet both medical and financial eligibility. Coverage restrictions apply to specific conditions. Medical conditions covered include but are not limited to:

- Arthritis
- Burns
- Cardiac
- Cerebral Palsy
- Cleft Lip and Palate
- Cystic Fibrosis
- Genitourinary
- Hearing
- Hemophilia
- Neurology
- Orthopedic
- Sickle Cell Anemia
- Seizures
- Spina bifida.

Both programs provide assistance for the following treatment-related services:

- Inpatient Care
- Outpatient Care


- Home Medical Equipment
- Emergency Care
- Prescription Medications and
- Blood Factor Products.


Financial eligibility for both the Adult Genetics Treatment Program and the Children with Special Health Care Needs Program is based on the U.S. Department of Health and Human Services Poverty Income Guidelines. Families or individuals whose income is at or below 185 percent of the Poverty Income Guidelines are considered financially eligible.

Both adult and children programs offer service coordination services as a benefit of participation. Service coordination is a collaborative process, which assists individuals and/or families in identifying, planning, and locating medical, and other health related services.

For additional information regarding these or other programs offered by the Bureau of Special Health Care Needs, please call (573) 751-6246 or (800) 451-0669.

## LATE BREAKERS

 **Immunization Videoconference Date Change**—The date for **Preparing for the Next Influenza Pandemic (Part II)** videoconference has been changed from June 22 to July 13, 2000. For more information about this course, please contact the immunization representative in your district health office or the Section of Vaccine-Preventable and Tuberculosis Disease Elimination at (800) 699-2313.

 **Emergency Rule Changes**—The Missouri Department of Health is promulgating emergency amendments to the following rules: 19 CSR 20-20.010, Definitions Relating to Communicable, Environmental and Occupational Diseases; 19 CSR 20-20.020, Reporting Communicable, Environmental and Occupational Diseases; 19 CSR 20-26.030, Human Immunodeficiency Virus (HIV) Test Consultation and Reporting; 19 CSR 20-26.040, Physician Human Immunodeficiency Virus (HIV) Test Consultation and Reporting.

In addition, the department is rescinding 19 CSR 20-20.080, Duties of Laboratories, and promulgating an emergency rule of the same name and number. The emergency amendments/rule will become effective by the end of April 2000 and will be printed in the May 15th edition of the *Missouri Register*. The *Missouri Register* may be accessed through the Missouri Secretary of State home page at <http://mosl.sos.state.mo.us/moreg/moreg.htm>.

If you have questions about these rule changes, please contact the Office of Surveillance at (573) 751-9071.



# Missouri Statewide Food Service Survey, 1998

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In the fall of 1998, the Missouri Department of Health (MDOH) conducted a statewide survey of 1,200 randomly selected food service establishments (FSEs) to determine the baseline level of factors affecting food safety, and to identify public health needs in the state's food service industry. An inventory of FSEs in Missouri was compiled from lists obtained from local public health agencies. Penal, day care, seasonal and private food services were excluded. A random sample of FSEs was then surveyed by a team of MDOH environmental public health specialists. All members of the survey team had previously completed Hazard Analysis and Critical Control Points (HACCP) training, and were experienced in MDOH inspection methodology and the use of MDOH inspection forms. The survey included an on-site inspection and completion of a questionnaire. The statistical power of the survey design was determined to be a confidence level of greater than 99%, with a 3% sample error.

Table 1 shows the types and numbers of FSEs surveyed, and the average number of critical and non-critical defects in the handling and preparation of food items

observed in each type of establishment. Restaurants comprised 54.1 percent of all the FSEs surveyed, and had the highest average number of observed critical and non-critical defects (3.35 and 11.36, respectively). Caterers had the lowest average number of observed critical defects (1.31).

Each FSE was questioned regarding a number of variables potentially associated with the presence or absence of defects in food handling and preparation, but only two of these variables were found to have a statistically significant relationship to a lower average number of critical defects: 1) A history of the respondent having received **formal training in food safety**, and 2) Documentation at the local public health agency indicating the facility had received a **follow-up food service inspection** after being previously identified by an inspector as having one or more critical defects in food handling and preparation.

Schools and senior citizen nutritional sites had consistently higher levels of food safety training, and this was associated with the presence of lower average numbers of critical defects in these sites compared with most other types of FSEs.

No significant relationship was observed between the average number of meals served per day, or the average number of

employees, and the average number of critical defects. That is, there was no evidence that small FSEs would be more, or less, likely to have critical defects than large FSEs.

The results were analyzed according to whether the surveyed FSEs were in jurisdictions that had local food service ordinances. Of the 1,200 establishments surveyed, 786 (65.5%) were in areas that had such ordinances, and 414 (34.5%) were in areas that did not have these ordinances. No significant difference in the average number of critical defects was observed between these two sets of establishments. It was noted that, on average, routine inspection cycles were shorter in jurisdictions with food service ordinances than in jurisdictions without these ordinances. The fact that this difference in inspection intervals was not associated with a significant difference in the average number of critical defects suggests that the time sequence of routine inspections may be dictated more by regulatory requirements than by identified risks to food safety.

The results were also analyzed according to whether the FSEs surveyed were in metropolitan or non-metropolitan areas. Of the 1,200 surveyed establishments, 706 (58.8%) were in metropolitan areas, and 494 (41.2%) were in non-metropolitan areas. There was no significant difference in the average number of critical  
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**Table 1. Types, Numbers, and Percentages of Food Service Establishments Surveyed, and Average Numbers of Critical and Non-critical Defects Observed, MDOH Statewide Food Service Survey, 1998.**

Type of Food Service Establishment	Numbers and Percentages Surveyed	Average Number of Critical Defects	Average Number of Non-Critical Defects
Restaurant	649 ( 54.1%)	3.35	11.36
School	144 ( 12.0%)	2.17	5.72
Convenience Store	126 ( 10.5%)	1.89	7.36
Tavern	120 ( 10.0%)	2.25	8.26
Deli	87 ( 7.3%)	2.56	6.87
Senior Citizen Nutritional Site	22 ( 1.8%)	2.05	7.14
Caterer	16 ( 1.3%)	1.31	7.19
Other	36 ( 3.0%)	1.42	6.56
<b>TOTAL</b>	<b>1,200 (100.0%)</b>	<b>2.78</b>	<b>9.35</b>

# Salmonella typhimurium Outbreak Associated With Young Poultry

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## Introduction

Although the majority of reported salmonella cases are acquired through foodborne transmission, it is important to remember that pets such as poultry and reptiles can also serve as vectors for disease.<sup>1-7</sup> This article describes risk factors for transmission in a 1999 salmonella outbreak in Missouri associated with young poultry purchased for Easter. For persons who handled young poultry such as chicks and ducklings, handwashing was found to be highly protective in preventing salmonella infection.

In April 1999, the Missouri Department of Health noted a cluster of nine *Salmonella typhimurium* cases (serotype 051). Cases were scattered throughout the state; seven of the nine cases were under age seven. Histories revealed no common food sources, but uncovered a common theme of exposure to pet chicks or ducklings purchased for the Easter season. Further investigation ensued.

An outbreak-associated case was defined as a Missouri resident with culture-confirmed *Salmonella typhimurium* 051 serotype, reported from April 4 to May 30, 1999. Of 40 cases that met this definition, 32 (80%) reported exposure to some form of young poultry. Sources of poultry associated with Missouri cases were traced back to two hatcheries. In cooperation with the Missouri Department of Agriculture, these hatcheries were inspected and found to have good sanitary and production process; cultures of feed and feces were subsequently negative. The outbreak was declared over at the end of May, and a case control study

**Table 1. Characteristics of Ill and Not Ill Persons, *Salmonella typhimurium* Outbreak Associated With Young Poultry, Missouri, March 1999**

Characteristic	Cases		Controls		Total	
	n	%	n	%	n	%
<b>Age</b>						
1-7	10	(50)	20	(50)	30	(50)
8-14	5	(25)	10	(25)	15	(25)
15-50	5	(25)	10	(25)	15	(25)
<b>Sex</b>						
Female	8	(40)	27	(68)	35	(58)
Male	12	(60)	12	(30)	24	(40)
Unknown	0	(0)	1	(3)	1	(2)
<b>Total</b>	<b>20</b>	<b>(100)</b>	<b>40</b>	<b>(100)</b>	<b>60</b>	<b>(100)</b>

**Table 2. Species of Poultry Obtained by Ill and Not Ill Persons, *Salmonella typhimurium* Outbreak Associated With Young Poultry, Missouri, March 1999**

Poultry Obtained	Ill		Not Ill		Total	
	n	%	n	%	n	%
Chicks	15	(37)	26	(63)	41	(100)
Ducklings	9	(29)	22	(71)	31	(100)
Goslings	-	--	2	(100)	2	(100)
Turkeys	-	--	5	(100)	5	(100)
<b>Total</b>	<b>24</b>	<b>(30)</b>	<b>55</b>	<b>(70)</b>	<b>79</b>	<b>(100)</b>

Note: Because some families purchased more than one species of poultry, there are more poultry than human subjects; illness refers to illness in humans.

was initiated to provide some answers to questions about mechanisms of transmission and risk factors for illness.

## Methods

Questionnaires included questions about type of poultry and place of purchase, frequency of handling, personal hygiene, and housing of poultry. Twenty of the cases in the original outbreak were selected to represent the state geographically, and 40 new controls without illness who had also purchased poultry were obtained through media advertisements and word of mouth and matched by age range to cases. Participants were interviewed by phone, and data were analyzed using Epi Info 6.02b.

## Results

Study subjects were mostly in the younger age groups with a range of 1-50 years of age; 30 (50%) were under the age of 8, and 15 (25%) were over the age of 14; 35 (58%) were females and 24 (40%) were males. See Table 1.

Although seven families purchased other kinds of poultry (5 goslings and 2 turkeys), the majority of young poultry were either chicks (41) or ducklings (31). There was no illness among persons who had purchased goslings (2) or turkeys (5); but 15 (37%) of those purchasing chicks and 9 (29%) of those purchasing ducklings were ill. See Table 2.

**Table 3. Characteristics Associated With Illness, *Salmonella typhimurium* Outbreak Associated With Young Poultry, Missouri, March 1999\***

<u>Risk Factors</u>	<u>Ill</u>	<u>Not Ill</u>	<u>OR</u>	<u>CI</u>	<u>p-value</u>
Washed hands	6	31	0.00	0.00, 0.18	0.000
Still have poultry	6	32	0.11	0.03, 0.43	0.000
Kissed poultry	1	16	0.11	0.00, 0.99	0.018
Handled poultry daily	14	20	2.80	0.73, 11.17	0.074
Kept poultry outside	6	5	3.00	0.65, 14.16	0.099
Cleaned up after poultry	5	3	4.11	0.71, 25.87	0.073
Poultry died in 2 weeks	7	1	21.00	2.10, 508.1	0.000

\*Please note when interpreting these figures that the number of subjects in the study was small.

Risk factors for illness are described in Table 3. Handwashing was the most protective behavior for prevention of illness (OR 0.0, CI 0.0, 0.18), followed by still having the young poultry at the time of the study (OR 0.11, CI 0.03, 0.43). Kissing the young poultry was found to be protective, but this factor was highly associated with handwashing, as those who kissed the poultry were also more likely to wash their hands. Poultry dying within two weeks of purchase was significantly associated with illness (OR 21.0, CI 2.1, 508.1). Cleaning up after the poultry, keeping the poultry outside, and frequency of handling were also associated with illness, but these risk factors were less statistically significant. See Table 3.

## Conclusions

The findings from the study were consistent with biologic plausibility. Young poultry have the potential for the transmission of disease to humans, and this risk was markedly higher if the young poultry died. There was a trend for association of illness with increased contact with poultry (handling or cleaning). Handwashing was found to be protective even with a contact such as kissing the young poultry. Persons purchasing young poultry should be encouraged to pay attention to personal hygiene, particularly handwashing.

## Public Health Interventions

To address these concerns, the Missouri Department of Health has developed an informational brochure to be distributed

with young poultry, for both mail-order and retail stores, and a press release will be issued prior to the Easter season in the spring of 2000. An article will also be published in the Centers for Disease Control and Prevention's Morbidity and Mortality Weekly Report.

For more information, please contact the Section of Communicable Disease Control and Veterinary Public Health at (800) 392-0272.

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## Food Service Survey

(continued from page 9)

defects between these two sets of establishments.

Finally, the majority of critical defects identified on inspection were "behavioral," i.e., directly caused by human action, or lack thereof. "Behavioral" type critical defects are thought to be best remedied by training activities (education with an emphasis on behavior modification).

## Conclusions

The statewide food service survey conducted by MDOH in 1998 provided a useful way to identify factors associated with the occurrence of critical defects in food handling and preparation in FSEs in Missouri. Results of the survey indicate that two specific interventions may be beneficial in reducing the numbers of critical defects in these establishments: 1) Increased training of food service workers and 2) Consistent provision of follow-up inspections of FSEs where prior inspections have found critical defects.

If you have questions about this survey, please contact the Office of Epidemiology at (573) 751-6128.



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## Upcoming Conference

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Healthcare professional **new** to the field or to the tasks of an infection control professional, or who assists with:

- the infection control program in any healthcare setting (acute care, ambulatory care, home health, long-term care, mental health, public health, rehabilitation, other)
- consultation on infectious disease prevention and control
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